



### Exercise 3A

- 1 Some data is collected.  $Q_1 = 46$  and  $Q_3 = 68$ .

A value greater than  $Q_3 + 1.5 \times (Q_3 - Q_1)$  or smaller than  $Q_1 - 1.5 \times (Q_3 - Q_1)$  is defined as an outlier.

Work out whether the following are outliers using this rule:

- a 7                      b 88                      c 105

- 2 The masses of male and female turtles are given in grams. For males, the lower quartile was 400 g and the upper quartile was 580 g. For females, the lower quartile was 260 g and the upper quartile was 340 g.

An outlier is an observation that falls either  $1 \times$  (interquartile range) above the upper quartile or  $1 \times$  (interquartile range) below the lower quartile.

- a Which of these male turtle masses would be outliers?

400 g      260 g      550 g      640 g

- b Which of these female turtle masses would be outliers?

170 g      300 g      340 g      440 g

- c What is the largest mass a male turtle can be without being an outlier?

**Hint** The definition of an outlier here is different from that in question 1. You will be told which rule to use in the exam.

- 3 The masses of arctic foxes are found and the mean mass was 6.1 kg. The variance was 4.2.

An outlier is an observation which lies  $\pm 2$  standard deviations from the mean.

- a Which of these arctic fox masses are outliers?

2.4 kg      10.1 kg      3.7 kg      11.5 kg

- b What are the smallest and largest masses that an arctic fox can be without being an outlier?

- E** 4 The ages of nine people at a children's birthday party are recorded.  $\Sigma x = 92$  and  $\Sigma x^2 = 1428$ .

- a Calculate the mean and standard deviation of the ages. **(3 marks)**

An outlier is an observation which lies  $\pm 2$  standard deviations from the mean.

One of the ages is recorded as 30.

- b State, with a reason, whether this is an outlier. **(2 marks)**

- c Suggest a reason why this age could be a legitimate data value. **(1 mark)**

- d Given that all nine people were children, clean the data and recalculate the mean and standard deviation. **(3 marks)**

#### Problem-solving

After you clean the data you will need to find the new values for  $n$ ,  $\Sigma x$  and  $\Sigma x^2$ .